**Nature of EM Wave Summary Sheet**

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| **EM Waves, Nature of** | | | |
| EM Waves:   1. Result of fluctuating electric and magnetic fields. EM waves are transverse waves. 2. Have the properties of all waves (speed, wavelength, frequency, amplitude) 3. Follow v = fλ = 3 x 108 m/s in vacuum. 4. Wave effects apply to EM waves (Doppler, Superposition, Diffraction, beats). | |  | |
| **EM Spectrum from low to high frequency**   * Radio waves: longest EM waves * Microwaves: communication, radar, heating food * Infrared: Far IR are thermal and heat waves – “see in the dark”. Near IR are invisible and used for remote controls. * Visible: only EM humans can see * Ultraviolet: causes sunburn * X-rays: medical uses * Gamma: nuclear explosions, medical uses, outer space objects | **See back side for larger image** | | |
| **Doppler Effect for EM Waves**   * Use the "+" sign if the observer and source are moving towards one another * Use the "-" sign if the observer and source are moving away from one another | | | **Polarization of Light**  S = ½ So  **Malus's Law**  **S = So cos2(θ)** where S = ave intensity leaving Analyzer  So = ave intensity entering Analyzer  θ = angle between the transmission axes |

